

Application No. 10/790,763  
Reply to Office Action of September 30, 2005

Docket No.: K2020.0005/P005

AMENDMENTS TO THE CLAIMS

1. (Canceled).
2. (Currently Amended) A particle beam therapy system comprising:
  - a charged particle beam generator for emitting a charged particle beam;
  - a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;
  - a first beam transport system connected to said charged particle beam generator and transporting the charged particle beam emitted from said charged particle beam generator;
  - a plurality of second beam transport systems provided respectively corresponding to said treatment rooms, connected to said first beam transport system, and transporting the charged particle beam transported through said first beam transport system to the corresponding irradiation units disposed in said treatment rooms; [[and]]
    - a control information forming unit for forming control command information, which includes control information for a plurality of elements provided in the second beam transport system introducing the charged particle beam to the irradiation unit in the selected treatment room, by using at least treatment room information representing the selected treatment room and treatment plan information specified depending on patient identification information;
    - a plurality of detectors for outputting detected signals representing at least respective status of said plurality of elements; and  
an information confirming unit for confirming that element status information based on the detected signals from said plurality of detectors are matched with said control command information;  
said control information forming unit forming, as said control command information for said plurality of elements disposed in said second beam transport

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system associated with said selected treatment room, control command information including control data for controlling said plurality of elements, while, for said plurality of elements disposed in said second beam transport systems other than said second beam transport system associated with said selected treatment room, forming control command information including no control data for controlling said plurality of elements.

said information confirming unit effecting said confirmation as said control command information by receiving all of the status information for the elements of all of said second beam transport systems, and excluding, from said all of the status information, the status information for the elements corresponding to the control command information including no control data thereby to select only the status information for the elements corresponding to the control command information including the control data, and then confirming that the selected status information is matched with the control data included in said control command information; and  
said information confirming unit outputting an emission authorization signal after making said confirmation.

3. (Original) A particle beam therapy system according to Claim 2, wherein one of said plurality of elements is a path switching device disposed at each of junctions between a beam path in said first beam transport system and beam paths in said plurality of second beam transport systems, and switching the beam path in which the charged particle beam is introduced.

4. (Currently Amended) A particle beam therapy system comprising:  
a charged particle beam generator for emitting a charged particle beam;  
a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;

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a first beam transport system connected to said charged particle beam generator and transporting the charged particle beam emitted from said charged particle beam generator;

a plurality of second beam transport systems provided respectively corresponding to said treatment rooms, connected to said first beam transport system, and transporting the charged particle beam transported through said first beam transport system to the corresponding irradiation units mounted to rotating gantries disposed in said treatment rooms;

a plurality of path switching devices disposed at each of respective junctions between a beam path in said first beam transport system and beam paths in said plurality of second beam transport systems, and switching the beam path in which the charged particle beam is introduced; and

a control information forming unit for forming control command information, which is related to the path switching device for introducing the charged particle beam to the irradiation unit in the selected treatment room, by using at least treatment room information representing the selected treatment room and treatment plan information specified depending on patient identification information;

a plurality of detectors for outputting detected signals at least representing respective statuses of said path switching devices; and

an information confirming unit for confirming that status information of said path switching devices based on the detected signals from said plurality of detectors are matched with said control command information;

said control information forming unit forming, as said control command information for said path switching device for the beam path associated with said selected treatment room, control command information including control data for controlling said path switching device, while, for said path switching devices other than the path switching device associated with said selected treatment room, forming

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control command information including no control data for controlling said path switching devices.

said information confirming unit effecting said confirmation as said control command information by receiving all of the status information for all of said path switching devices, and excluding, from said all of the status information, the status information for the path switching devices corresponding to the control command information including no control data thereby to select only the status information for the path switching device corresponding to the control command information including the control data, and then confirming that the selected status information is matched with the control data included in said control command information; and

said information confirming unit outputting an emission authorization signal after making said confirmation.

5. (Canceled).

6. (Currently Amended) A particle beam therapy system comprising:  
a charged particle beam generator for emitting a charged particle beam;  
a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;  
a charged particle beam transport apparatus having a plurality of beam paths, communicated with said charged particle beam generator, and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms; [[and]]  
a control information forming unit for forming control command information, which includes at least energy information for the charged particle beam exiting from said charged particle beam accelerator and excitation information for a plurality of electromagnets disposed in the beam path introducing the charged particle beam to the irradiation unit in the selected treatment room, by using at least treatment room

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information representing the selected treatment room and treatment plan information specified depending on patient identification information;

a plurality of detectors for outputting detected signals at least representing respective status of said plurality of electromagnets; and

an information confirming unit for confirming that status information of said plurality of electromagnets based on the detected signals from said plurality of detectors are matched with said control command information;

said control information forming unit forming, as said control command information for said plurality of electromagnets disposed in the beam path associated with said selected treatment room, control command information including control data for controlling said electromagnets, while, for said plurality of electromagnets disposed in the beam paths other than said beam path associated with said selected treatment room, forming control command information including no control data for controlling said electromagnets.

said information confirming unit effecting said confirmation as said control command information by receiving all of the status information for said electromagnets disposed in all of said beam paths, and excluding, from said all of the status information, the status information for the electromagnets corresponding to the control command information including no control data thereby to select only the status information for the electromagnets corresponding to the control command information including the control data, and then confirming that the selected status information is matched with the control data included in said control command information; and

said information confirming unit outputting an emission authorization signal after making said confirmation.

7. – 10. (Canceled).

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11. (Original) A particle beam therapy system according to Claim 2, further comprising a storage for storing the treatment plan information, wherein the treatment plan information specified depending on the patient identification information is information taken from said storage into said control information forming unit by using the patient identification information.

12. (Original) A particle beam therapy system according to Claim 4, further comprising a storage for storing the treatment plan information, wherein the treatment plan information specified depending on the patient identification information is information taken from said storage into said control information forming unit by using the patient identification information.

13. (Original) A particle beam therapy system according to Claim 6, further comprising a storage for storing the treatment plan information, wherein the treatment plan information specified depending on the patient identification information is information taken from said storage into said control information forming unit by using the patient identification information.

14. (Canceled).

15. (Canceled).

16. (Original) A particle beam therapy system according to Claim 2, further comprising a controller for, based on said control command information, controlling said elements disposed in said beam path introducing the charged particle beam to the irradiation unit in the selected treatment room.

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17. (Original) A particle beam therapy system according to Claim 4, further comprising a controller for, based on said control command information, controlling said path switching device for introducing the charged particle beam to the irradiation unit in the selected treatment room.

18. (Original) A particle beam therapy system according to Claim 6, further comprising a controller for, based on said control command information, controlling said electromagnets disposed in said beam path introducing the charged particle beam to the irradiation unit in the selected treatment room.

19. (Canceled).

20. (Currently Amended) A particle beam therapy system comprising:  
a charged particle beam generator for emitting a charged particle beam;  
a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;  
a charged particle beam transport apparatus having a plurality of beam paths, communicated with said charged particle beam generator, and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms;  
first element groups disposed respectively in said beam paths;  
a control information forming unit for forming control command information for the first element group disposed in the beam path extended into the selected treatment room by using at least treatment room information representing the selected treatment room and treatment plan information specified depending on patient identification information; and  
an information confirming unit for selecting, from among element information including status information representing respective status[[es]] of said first element

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groups, the status information of said first element group in the beam path extended into the selected treatment room, and confirming that the selected status information is matched with the control command information for the relevant first element group, which is included in said control command information;

said control information forming unit forming, as said control command information for the first element group disposed in the beam path extended into the selected treatment room, control command information including control data for controlling said first element group, while, for said first element groups other than the first element group disposed in the beam path extended into the selected treatment room, forming control command information including no control data for controlling said first element groups.

said information confirming unit effecting said selection of the status information by receiving the element information including all of the status information for all of said fist element groups and then excluding, from said all of the status information, the status information for the first element groups corresponding to the control command information including no control data thereby to select only the status information for the first element group corresponding to the control command information including the control data, and effecting said confirmation as said control command information by confirming that the selected status information is matched with the control data included in said control command information; and

said information confirming unit outputting an emission authorization signal after making said confirmation.

21. (Currently Amended) A particle beam therapy system comprising:
  - a charged particle beam generator for emitting a charged particle beam;
  - a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;

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a charged particle beam transport apparatus having a plurality of beam paths, communicated with said charged particle beam generator, and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms;

first element groups disposed respectively in said beam paths;

a control information forming unit for forming control command information including control information for a plurality of first elements included in the first element group in the beam path extended into the selected treatment room by using at least treatment room information representing the selected treatment room and treatment plan information specified depending on patient identification information; and

an information confirming unit for selecting, from among element information including detected status information of respective first elements, the status information of the first elements included in the first element group in the beam path extended into the selected treatment room, and confirming that the selected status information is matched with the control information for the relevant first elements, which is included in said control command information;

said control information forming unit forming, as said control command information including control information for said plurality of first elements included in the first element group disposed in the beam path extended into the selected treatment room, control command information including control data for controlling said first elements, while, for a plurality of first elements included in said first element groups other than the first element group disposed in the beam path extended into the selected treatment room, forming control command information including no control data for controlling said first elements.

said information confirming unit effecting said selection of the status information by receiving the element information including all of the status

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information for said first elements included in all of the first element groups and then excluding, from said all of the status information, the status information for the first elements included in the first element groups corresponding to the control command information including no control data thereby to select only the status information for the first elements included in the first element group corresponding to the control command information including the control data, and effecting said confirmation as said control command information by confirming that the selected status information is matched with the control data included in the control command information; and  
said information confirming unit outputting an emission authorization signal after making said confirmation.

22. (Currently Amended) A particle beam therapy system comprising:  
a charged particle beam generator for emitting a charged particle beam;  
a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;  
a charged particle beam transport apparatus having a plurality of beam paths, communicated with said charged particle beam generator, and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms;  
first element groups disposed respectively in said beam paths, and a second element group disposed in said charged particle beam generator;  
a control information forming unit for forming control command information including control information for a plurality of first elements included in the first element group in the beam path extended into the selected treatment room, and control information for a plurality of second elements included in the second element group by using at least treatment room information representing the selected

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treatment room and treatment plan information specified depending on patient identification information; and

an information confirming unit for selecting, from among element information including detected status information of respective first elements and detected status information of respective second elements, the status information for said first element group in the beam path extended into the selected treatment room and the status information for said second element group, and confirming that the selected status information is matched with the control information for the relevant elements, which is included in said control command information;

said control information forming unit forming, as said control command information including control information for said plurality of first elements included in the first element group disposed in the beam path extended into the selected treatment room and said plurality of second elements included in the second element group, control command information including control data for controlling said first and second elements, while, for a plurality of first elements included in said first element groups other than the first element group disposed in the beam path extended into the selected treatment room, forming control command information including no control data for controlling said first elements,

said information confirming unit effecting said selection of the status information by receiving the element information including all of the status information for said first elements included in all of the first element groups and all of the status information for said second elements included in the second element group and then excluding, from said all of the status information for said first and second elements, the status information for the first elements included in the first element groups corresponding to the control command information including no control data thereby to select only the status information for the first elements included in the first element group and the second elements included in the second element group

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corresponding to the control command information including the control data, and effecting said confirmation as said control command information by confirming that the selected status information is matched with the control data included in the control command information; and

said information confirming unit outputting an emission authorization signal after making said confirmation.

23. – 25. (Canceled).

26. (Currently Amended) A particle beam therapy system according to Claim 20 [[44]], further comprising:

a first element controller for outputting the control information for said first elements in said first element group, which is included in the control command information outputted from said control information forming unit; and

an element information confirming unit for confirming that the detected status information of said first elements is matched with the control information for said first elements.

27. (Original) A particle beam therapy system according to Claim 26, further comprising:

a plurality of shutters provided respectively in said plurality of beam paths and shutting off the corresponding beam paths; and

a safety device for generating a beam stop signal for stopping the charged particle beam when said confirmation has not been made by said element information confirming unit, thereby closing the shutter provided in said beam path extended into the selected treatment room in response to said beam stop signal.

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28. (Original) A particle beam therapy system according to Claim 22, further comprising:

a first element controller for outputting the control information for said first elements in said first element group, which is included in the control command information outputted from said control information forming unit;

a second element controller for outputting the control information for said second elements in said second element group, which is included in the control command information outputted from said control information forming unit;

a first element information confirming unit for confirming that the detected status information of said first elements is matched with the control information for said first elements; and

a second element information confirming unit for confirming that the detected status information of said second elements is matched with the control information for said second elements.

29. (Original) A particle beam therapy system according to Claim 28, further comprising:

a plurality of shutters provided respectively in said plurality of beam paths and shutting off the corresponding beam paths; and

a safety device for generating a beam stop signal for stopping the charged particle beam when said confirmation has not been made by any of said first element information confirming unit and said second element information confirming unit, thereby closing the shutter provided in said beam path extended into the selected treatment room with said beam stop signal.

30. (Currently Amended) A particle beam irradiating method for irradiating a charged particle beam emitted from a charged particle beam generator to

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a patient in selected one of a plurality of treatment rooms by an irradiation unit in the selected treatment room, the irradiating method comprising the steps of:

forming control command information for one of element groups disposed in a plurality of beam paths, which are communicated with said charged particle beam generator and transport the charged particle beam emitted from said charged particle beam generator to corresponding ones of said plurality of treatment rooms, the one of said element groups being disposed in the beam path extended into the selected treatment room, by using at least treatment room information representing the selected treatment room and treatment plan information specified depending on patient identification information; and

selecting, from among element information including status information representing respective status[[es]] of said element groups, the status information of the element group in the beam path extended into the selected treatment room, and confirming that the selected status information is matched with said control command information.

said formation of the control command information being effected by forming, as said control command information for the first element group disposed in the beam path extended into the selected treatment room, control command information including control data for controlling said first element group, while, for said first element groups other than the first element group disposed in the beam path extended into the selected treatment room, forming control command information including no control data for controlling said first element groups.

said selection of the status information being effected by receiving the element information including all of the status information for all of said first element groups and then excluding, from said all of the status information, the status information for the first element groups corresponding to the control command information including

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no control data thereby to select only the status information for the first element group corresponding to the control command information including the control data,  
said confirmation as said control command information being effected by confirming that the selected status information is matched with the control data included in said control command information; and  
outputting an emission authorization signal after making said confirmation.